Component 2: Collecting, Presenting and Interpreting Data

Levels: **1/2**

Assessment type: **Internal**

Guided learning hours: **36**

Component in brief

Learners will understand the characteristics of data and information and how they help organisations in decision making. They will use data manipulation methods to create a dashboard to present and draw conclusions from information.

Introduction

In order to make decisions, organisations collect vast amounts of data from a range of different sources. They need to use appropriate data-collection methods to ensure that the data is of sufficient quality to enable decision making. Data must then be converted into information to allow it to become useful. In this component, you will learn the different data manipulation tools that can be used to change the way that data is presented. You will provide clear summaries of the data and present them in a dashboard that will allow organisations to make effective decisions.

Even when data has been converted into information, it will not provide any conclusions on its own. It is up to the data user to be able to look at the information and draw conclusions, so how the information is presented is key to ensuring that effective and accurate decisions are made. In this component, you will learn the different presentation features that can be used to ensure that information is understood clearly in an objective way so that it is not misinterpreted.

This component will build on Key Stage 3, where you have learned about how to create programs. This component will help to develop your understanding of how to represent information in different ways to give it more meaning. The component will help you to progress to further vocational or academic qualifications. It will enable you to develop transferable data manipulation tools that you can use to make effective decisions in all areas of study and employment. It will also help you to focus on your chosen specialism in more detail, for example managing big data, business analytics.

Learning aims

A Investigate the role and impact of using data on individuals and organisations

B Create a dashboard using data manipulation tools

C Draw conclusions and review data presentation methods.

Teaching content

Learning aim A: Investigate the role and impact of using data on individuals and organisations

A1 Characteristics of data and information

Learners will understand the concepts of data and that data is meaningless without converting it into information by adding structure and context.

- Characteristics of data:
  - no meaning
  - no structure
  - no context
  - unprocessed.
- Characteristics of information:
  - has meaning
  - has structure
  - has context
  - is processed.

A2 Representing information

Learners will understand the different ways of representing information and will be able to explain situations where they would be used.

- text
- numbers
- tables
- graphs/charts
- infographics.

A3 Ensuring data is suitable for processing

Learners will understand the methods that can be used to ensure data input is suitable and within boundaries so that it is ready to be processed.

- Validation methods:
  - range check
  - type check
  - lookup check
  - data type check
  - presence check
  - length check.
- Verification methods:
  - proofreading
  - double entry.

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A4 Data collection

Learners will understand how the data collection method and data collection features affect its reliability.

- Data collection methods:
  - primary data – information collected directly from source
  - secondary data – information collected by third party.
- Data collection features:
  - size of sample
  - who was in the sample
  - where the data was collected
  - when the data was collected
  - methods used.
- Big data:
  - definition of big data – a large collection of data collected from a large number of sources
  - collection of big data, e.g. social networks, shop loyalty schemes, census, sensors, ATM/cash machines, mobile phone networks, Wi-Fi points, digital television, search engine data, e-commerce.

A5 Quality of information and its impact on decision making

Learners will understand the factors that affect the quality of information and their impact on decision making.

- Quality of information factors:
  - source/collection method
  - accuracy
  - age
  - completeness
  - amount of detail
  - format/presentation
  - volume.

A6 Sectors that use data modelling

Learners will understand that different types of organisation use data modelling to help make decisions.

- Types of sectors, e.g.:
  - transport
  - education
  - retail
  - banking
  - entertainment
  - government
  - health care
  - construction
  - communication
  - health and safety.

- Data modelling in decision making, e.g.:
  - which customers to target for advertisements
  - where to deploy staff during busy periods
  - just-in-time delivery
  - where and when to adapt transport schedules
  - financial management
  - accident prevention
  - demographic analysis.

A7 Threats to individuals

Learners will understand the different threats that face individuals who have data stored about them.

- Threats to individuals, e.g.:
  - invasion of privacy
  - fraud
  - targeting vulnerable groups of people
  - inaccurate data could be stored.

Learning aim B: Create a dashboard using data manipulation tools

B1 Data processing methods

Learners will understand how data can be imported from an external source. They will then explore how to apply data processing methods. These include:

- data manipulation methods:
  - importing data, e.g. from other files, the internet
  - formulae, e.g. add, divide, subtract, multiply
  - decision-making functions, e.g. IF, WHATIF, SUMIF
  - lookup functions, e.g. VLOOKUP, HLOOKUP
  - string operation functions, e.g. LEFT, RIGHT
  - count functions, e.g. COUNTBLANK, COUNTIF
  - logical operators, e.g. NOT, AND, OR
  - sorting, e.g. sorting multiple columns and values
  - outline, e.g. group, ungroup, subtotal
  - filtering, e.g. greater than, less than, equals, contains, begins with, ends with
  - text to columns, e.g. delimited, fixed width.
- other processing methods:
  - absolute and relative cell referencing, e.g. use of dollar sign ($) and named cells
  - macros, e.g. for automatic navigation, change graph options, change data ranges
  - data validation, e.g. list check, type check, length check
  - multiple and linking worksheets, e.g. for dashboard and raw data
  - cell comments
  - alternative views, e.g. hiding/unhiding cells, freezing planes
  - conditional formatting, e.g. data bars, colour scales, icon sets.

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B2 Produce a dashboard

Learners will use a dashboard to select and display information summaries based on a given large data set.

- Show data summaries from the data set:
  - totals
  - counts
  - percentages
  - sales breakdowns
  - departmental breakdown
  - time allocations
  - budget allocations.
- Appropriate presentation methods:
  - form controls, e.g. dropdown menus, spinners, tick boxes, radio buttons
  - graphs/charts, including dynamic charts/graphs
  - pivot tables
  - conditional formatting
  - select data/range.
- Use appropriate presentation features:
  - font size, style and colour
  - cell borders and shading
  - graphics
  - axis labels
  - titles, including overall and section titles.

Learning aim C: Draw conclusions and review data presentation methods

C1 Drawing conclusions based on the data

Learners will draw conclusions on the data set, using their dashboard in order to make recommendations.

- Drawing conclusions, e.g.:
  - trends
  - patterns
  - anomalies
  - possible errors.
- Make recommendations, e.g.:
  - which customers/areas to target for advertisements
  - where to deploy staff to deal with increased demands
  - how and when to adapt transport schedules.

C2 How presentation affects understanding

Learners will assess how well they have used the presentation features listed in B2, to ensure they do not lead to:

- information being misinterpreted
- information being biased
- inaccurate conclusions being made.

Suggestions for delivery

Successful delivery of this component will allow learners to develop their knowledge and understanding of the role and impact of using data on individuals and organisations. Learners will develop their understanding on using data to ensure that effective and accurate decisions are made. Learners should be able to apply appropriate data manipulation tools to manipulate data and provide clear summaries in the form of a dashboard. They will develop their knowledge and understanding of how the presentation of their dashboard can affect the effectiveness of conclusions made.

You may choose to deliver this component alongside Components 1 and 3. Assignments can focus on each learning aim or you can combine them within or across components.

Essential information for setting assignments

The recommended structure for setting assignments is one for each learning aim, however you may combine learning aims within or across components. Suggested examples of how assignments may be set are outlined here. You should also refer to the authorised assignment briefs on our website. See *Section 5* for more information.

Learning aim A: Investigate the role and impact of using data on individuals and organisations

Description

Learners will be given a scenario outlining the data collected in two different sectors (not the data itself). The scenario will outline the data collection methods and features.

Learners will assess:

- how the data collection method (for example primary and secondary) and the data collection features (for example sample size, who was in the sample, when and where the data was collected) affect the quality of the data
- how the quality of data affects decision making across two different sectors (for example transport, education).

Example task(s)

- Learners will explore the data collection methods for two different sectors.
- Learners will assess how the data collection methods and features affect the quality of the data.
- Learners will assess how the data collection methods and quality of data affect decision making in two sectors.

Evidence

Evidence must fully meet the requirements of the assessment criteria and could include:

- a written document or a presentation (with speaker notes), assessing how the data collection methods affect the quality of data and decision making.

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Learning aim B: Create a dashboard using data manipulation tools

Description

Learners will be provided with a large data set, which they will import into spreadsheet software.

Learners will:

- select and apply the data manipulation methods listed in B1 to manipulate data in order to provide appropriate summaries of the data
- produce a dashboard to display the summaries of data using appropriate presentation features and presentation methods.

Example task(s)

- Learners will select and use methods to capture and manipulate data such as importing data, using functions, sorting, conditional formatting etc.
- Learners will select and use presentation methods and features to show their data in a dashboard.
- Learners will use their spreadsheet skills to manipulate data and create an effective dashboard using appropriate presentation methods and features.

Evidence

Evidence must fully meet the requirements of the assessment criteria and could include:

- a spreadsheet showing the imported dataset, the data manipulation methods used and a completed dashboard
- a written document containing screenshots that show the manipulation methods used and a completed dashboard
- annotated screenshots of the completed dashboard and dataset, outlining the choice of presentation features and the data manipulation tools used
- a printout of the final dashboard created.

Learning aim C: Draw conclusions and review data presentation methods
Description Learners will use their dashboard to draw conclusions and make appropriate recommendations. They will assess how the presentation features used in their dashboard affect how well the information is understood. **Example task(s)** • Learners will use their dashboard to: o identify patterns and trends in the data o draw conclusions on patterns and trends in the data and then make recommendations o assess how effective the presentation of the data on the dashboard is. **Evidence** Evidence must fully meet the requirements of the assessment criteria and could include: • a written document that shows the drawing of conclusions and recommendations made, and assessment of how the presentation of the dashboard influences its effectiveness.

Assessment criteria

The assessment criteria determine the standard required to achieve the component.

Level 1 Pass	Level 1 Merit	Level 2 Pass	Level 2 Merit	Level 2 Distinction
Learning aim A: Investigate the role and impact of using data on individuals and organisations				
A.1P1 Identify data collection methods across two sectors. **A.1P2** Identify data that is used to make decisions across two different sectors.	**A.1M1** Describe data collection methods across two sectors. **A.1M2** Describe data that is used to make decisions across two sectors.	**A.2P1** Explain how data collection methods and their features affect the quality of data across two sectors, with relevant examples. **A.2P2** Explain how data is used to make decisions across two sectors, with relevant examples.	**A.2M1** Discuss data collection methods and features used and how they affect the quality of data and decision making in two sectors, drawing justified conclusions.	**A.2D1** Assess data collection methods and features used and how they affect the quality of data and decision making in two sectors, drawing detailed justified conclusions.
Learning aim B: Create a dashboard using data manipulation tools				
B.1P3 Use methods to carry out limited manipulation of data, with a limited degree of accuracy. **B.1P4** Produce a dashboard that produces a limited summary of data.	**B.1M3** Use methods to carry out some manipulation of data, with some inaccuracies. **B.1M4** Produce a dashboard that produces a limited summary of data, with some appropriate presentation methods.	**B.2P3** Select and use methods to carry out some manipulation of data, which is largely accurate. **B.2P4** Produce an appropriate dashboard that clearly summarises data.	**B.2M2** Select and use relevant methods to effectively and accurately manipulate data and produce an effective dashboard that clearly summarises data.	**B.2D2** Select and use relevant methods to effectively and accurately manipulate data and produce a fully efficient and comprehensive dashboard.

Learning aim C: Draw conclusions and review data presentation methods				
C.1P5 Use the dashboard to identify trends in the data. **C.1P6** Identify the methods used to present data.	**C.1M5** Use the dashboard to outline some trends in the data. **C.1M6** Describe the methods used to present data so that it can be understood, with brief examples.	**C.2P5** Use the dashboard to draw conclusions, with some appropriate recommendations. **C.2P6** Explain the methods used to present data so that it can be clearly understood, with detailed examples.	**C.2M3** Analyse how the dashboard's presentation of data influences the conclusions drawn and the recommendations made, using relevant examples.	**C.2D3** Assess the effectiveness of the dashboard's presentation of data and how it affects the conclusions drawn and the recommendations made, using justified examples.

Level 1 Pass	**Level 1 Merit**	**Level 2 Pass**	**Level 2 Merit**	**Level 2 Distinction**
Overall component grade				
Learner evidence satisfies all Level 1 Pass criteria	Learner evidence satisfies **either**: all Level 1 Merit criteria **or** all Level 1 Pass criteria **and** C.2P5, C.2P6	Learner evidence satisfies all Level 2 Pass criteria	Learner evidence satisfies **either**: all Level 2 Merit criteria **or** all Level 2 Pass criteria **and** C.2D3	Learner evidence satisfies all Level 2 Distinction criteria

To be given a unit grade, a learner must complete assignments for all learning aims. Please refer to *Section 5* for further guidance on internal assessment, including how to apply criteria to evidence at Level 1 and Level 2.

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Essential information for assessment decisions

Assessors must take account of these definitions and examples in reaching assessment decisions.

Learning aim A: Investigate the role and impact of using data on individuals and organisations

Evidence for the assignment: learners will provide a written document showing an understanding of how two different sectors use data to make decisions. This will include how the data collection methods and its features affect the quality of information. At Level 2, learners will be able to provide relevant examples in the context of each sector. They will be able to make a link between the data collection methods used and how these can affect the data. Learners will be able to make a direct link between the collection methods/features and how they affect the quality of data. At Level 1, learners will focus more on how each sector uses data and may not be able to provide relevant examples. They may not be able to make a direct link between the data collection method and how it affects the quality of data.

For Level 2 Distinction: learners will assess in comprehensive detail how data is used across two different sectors in order to make decisions.

Their assessment will:

- be specific in what data organisations need in order to make decisions and give a wide range of relevant examples to the context; each example will be comprehensively justified
- include comprehensive detail as to how both primary and secondary data collection methods affect the data (e.g. sample size, who is asked). There will be a range of relevant examples; each example will be comprehensively justified
- explore the link between the data collection methods and features, and how they impact on the quality of data throughout.

For Level 2 Merit: learners will discuss in detail how data is used across two different sectors to make decisions. They will identify specific information and discuss how the sector uses that information to make decisions.

Their discussion will:

- provide a range of relevant examples to support their arguments
- detail how both primary and secondary data collection methods affect their features; they will provide a range of relevant examples to support their arguments
- explore the link between the data collection methods and features and how they impact on the quality of data in most examples.

For Level 2 Pass: learners will explain in some detail how data is used across two different sectors. Learners will identify specific information and explain how the sector uses that information to make decisions.

Their explanation will:

- provide relevant examples to support their arguments
- show how both primary and secondary data collection methods affect their features, using some detail; they will provide mostly relevant examples
- show the link between the data collection methods and features, and their impact on the quality of data will be explained in some examples.

For Level 1 Merit: learners will describe data that is used across two different sectors to make decisions. They will provide some examples although these may not always be relevant to the scenario. They will describe the data collection methods and features used in different sectors. They will not cover a full range of methods and features but will describe some which are relevant to the scenario.

For Level 1 Pass: learners will identify data that is used across two different sectors to make decisions. They will provide few or no examples to support their arguments. They will identify the data collection methods and features used in different sectors. They will not cover a full range of methods and features and those identified may not be relevant to the scenario.

Learning aim B: Create a dashboard using data manipulation tools

Evidence for the assignment: learners will be able to select and use different data manipulation tools to manipulate the data in a large data set and produce data summaries. They will then show their data summaries on a dashboard.

For example, learners could import datasets about:

- **transport** – learners could use historic road safety and accident data to see if accidents increase:
  - in different months of the year
  - at different times of the day
  - on different types of road (e.g. motorways, dual carriageways)
  - in different speed limit zones (e.g. 20 mph, 70 mph)
  - in different weather conditions (e.g. rain, frost).
- **the environment** – learners could use data about the volume of litter to determine if the amount of litter is affected by the:
  - area of the UK (e.g. North West, East Midlands)
  - type (e.g. footpaths, back alleys)
  - month of the year
  - number of fines issued in each cost group (e.g. £0 to £50, £51 to £200).
- **weather** – learners could use historic data to look for patterns and trends in the weather over time, including:
  - average temperature
  - average rainfall.

Learners could then combine this data with data from other datasets to determine if the weather had an impact on the:

- number of road accidents
- average retail sales
- amount of crime
- hospital visits/waiting times.

At Level 2, learners will be able to select and use appropriate and efficient data manipulation tools. They will use a full range of different presentation methods and features to create an effective dashboard. At Level 1, learners will use data manipulation tools, although these may not always be efficient. They will be able to state some reasons as to why these tools have been used. They will make some use of different presentation features but there are likely to be some weaknesses.

For Level 2 Distinction: learners will select and use effectively relevant data manipulation methods. They will use data manipulation methods with accuracy to manipulate a range of data. Learners will make efficient use of the data manipulation methods throughout their solution. This includes the use of complex functions (for example decision-making functions, string operation functions, lookup functions). The methods selected by learners will be comprehensively justified.

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Learners will provide a fully efficient and effective dashboard. This will:

- have a wide range of clear summaries of their manipulated data
- incorporate a wide range of appropriate presentation methods, including a range of different charts/graphics, tables, pivot tables and conditional formatting
- have presentation methods that are appropriate for the data being shown
- use suitable presentation features to create an effective dashboard that clearly summarises data
- include suitable use of titles, labels, graphics and a range of formatting features
- make use of automated features (e.g. buttons/macros, dropdown menus) to show some different aspects of the data on their dashboard. For example, learners could have a dropdown menu to show data from a range of different areas of their dataset.

For Level 2 Merit: Learners will select and use relevant data manipulation tools. Learners will accurately manipulate a range of data. They will make efficient use of data manipulation tools in the vast majority of places. This includes the use of advanced functions (for example decision-making functions, count function).

Learners will provide an efficient dashboard. This will:

- have a range of clear summaries of their manipulated data
- incorporate a range of appropriate presentation methods. This will include using a range of different charts/graphs, tables, pivot tables and conditional formatting; these will be used appropriately in the vast majority of places
- use suitable presentation features on their dashboard in the vast majority of places to communicate effective information
- make use of suitable titles, labels, graphics and formatting features
- make use of some automated features (e.g. buttons/macros, dropdown menus) to show a different aspect of the data. For example, learners could have a dropdown menu to show data from a different day/time.

For Level 2 Pass: learners will select and use some data manipulation methods. This includes the use of advanced functions (for example decision-making functions, count function). The methods used by learners will mostly be relevant. The tools selected will be mostly efficient however some alternative tools may have provided a more efficient approach. The data manipulated by learners will be largely accurate.

Learners will provide an appropriate dashboard. This will:

- have clear summaries of their manipulated data
- incorporate mostly appropriate presentation methods, including different charts/graphs and tables
- some presentation methods used will be appropriate for the data being shown
- make use of suitable presentation features on their dashboard in most places; this will include suitable use of titles, labels, graphics and formatting features in most places.

For Level 1 Merit: learners will select and use data manipulation methods although these are not always relevant. Learners are likely to have used simple arithmetic functions (for example SUM, MIN, MAX). Learners will carry out some manipulation of data with some inaccuracies. The data manipulation tools they select will be efficient in some places although alternative tools would provide a more efficient approach.

Learners will produce a dashboard to show limited summaries of data. This will:

- use some appropriate presentation methods, including a range of different graphs/charts and tables
- use limited presentation methods appropriate for the data being shown
- make some use of titles, labels, graphics and formatting features. There will be some weaknesses in the presentation methods features used, which will lead to the data being displayed in a way that is not easy to understand.

For Level 1 Pass: learners will use data manipulation methods to carry out limited manipulation of data. They are likely to have used simple arithmetic functions (for example SUM, MIN, MAX). Learners will carry out limited manipulation of data with a limited degree of accuracy. The data manipulation tools they select will be mostly inefficient and other tools available would have provided a more efficient approach.

Learners will produce a dashboard to show a limited summary of data. This will:

- make limited use of presentation methods
- make some use of different charts/graphs and tables although these may not always be appropriate for the data being shown
- include weaknesses in the presentation of the data.

Learning aim C: Draw conclusions and review presentation methods

Evidence for the assignment: learners will be able to use their dashboard to make conclusions and recommendations. They will show understanding of how the presentation features affected the conclusions and recommendations made. At Level 2, learners will be able to use their dashboard effectively to make relevant and specific conclusions. They will then be able to use their conclusions to make appropriate recommendations. They will show full awareness of how the presentation methods used lead to data not being biased, misunderstood or being used to make inaccurate decisions. At Level 1, learners will be able to use their dashboard to make some conclusions but they may not always be relevant. They are likely to provide few or no recommendations. They are likely to show limited understanding of how the presentation methods they have used allow their dashboard to be used to make accurate decisions.

For Level 2 Distinction: learners will use their dashboard to draw a range of specific, relevant and well justified conclusions. This will include trends, patterns and possible errors.

They will:

- provide specific, appropriate and effective recommendations based on their conclusions in thorough detail
- use their dashboard to give a wide range of relevant examples to support their conclusions and recommendations.

They will assess:

- the effectiveness of the presentation of their dashboard and how it affected the conclusions drawn and recommendations made
- how they have used appropriate presentation features to ensure the information on their dashboard was not biased, misunderstood or used to make inaccurate decisions.

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For Level 2 Merit: learners will use their dashboard to draw specific and relevant conclusions. This will include trends, patterns and possible errors.

They will:

- provide specific and appropriate recommendations based on their conclusions in detail
- use their dashboard to give a range of relevant examples to support their conclusions and recommendations.

They will analyse:

- how the presentation of their dashboard influenced conclusions drawn and recommendations made
- how they have used appropriate presentation features to ensure the information on their dashboard was not biased, misunderstood or used to make inaccurate decisions.

For Level 2 Pass: learners will use their dashboard to make some relevant conclusions in some detail. These will mostly be specific to their dashboard and include trends and patterns.

They will:

- provide some appropriate recommendations and these will mostly be relevant.

They will explain:

- the presentation methods used on their dashboard and how they lead to accurate conclusions being made.

For Level 1 Merit: learners will use their dashboard to outline trends in the data set.

They will:

- briefly describe some trends based on their data set.

They will describe:

- the presentation methods they have used on their dashboard and be able to describe how their dashboard could be used to make decisions.

For Level 1 Pass: learners will use their dashboard to identify trends, which are likely to be in the form of general statements that may not relate clearly to the dashboard.

They will:

- identify limited trends based on their data set.

They will:

- identify the presentation methods they have used on their dashboard but will not show awareness of how the presentation methods used impacts on the decisions made.

Resource requirements

For this component, learners must have access to*:*

- scenarios outlining the data collected in two different sectors
- a preselected big data set
- spreadsheet software.

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Component 3: Effective Digital Working Practices

Levels: **1/2**

Assessment type: **External**

Guided learning hours: **48**

Component in brief

Learners will explore how organisations use digital systems and the wider implications associated with their use.

Introduction

Modern organisations are increasingly reliant on the use of digital systems to complete every day, business-critical tasks. The development of these systems has presented organisations with many opportunities to work in new, inventive and flexible ways to achieve their aims. The systems have also brought new challenges and a range of responsibilities.

This component will give you an opportunity to explore how the developments in technology over recent years have enabled modern organisations to communicate and collaborate more effectively than ever before. The component is designed to allow you to explore the digital systems available to organisations and how their features have an impact on the way organisations operate. You will explore how developments in technology have led to more inclusive and flexible working environments, and how regulation and ethical and security concerns influence the way in which organisations operate.

You will analyse information in a range of vocational contexts so that you develop a greater understanding of the use of digital systems by organisations and so that you are able to make reasoned judgements on the systems. This component builds on Key Stage 3 where you will have learned how to use technology responsibly. In this component, you will learn about how organisations can use technology safely and about the cyber security issues when working in a digital organisation. The knowledge and skills you develop in this unit will give you a basis for further study in a range of subject areas, including computing, IT, engineering, creative and scientific, or you may go on to an apprenticeship or entry-level employment where your understanding of technology will be relevant.

Summary of assessment

This external component builds on knowledge, understanding and skills acquired and developed across the qualification. It requires learners to select and integrate knowledge and understanding synoptically from all components. It is assessed through an external assessment that is set and marked by Pearson. Questions will require learners to apply knowledge and understanding to the given scenarios or context. The external assessment will include questions totalling 60 marks. The test duration is 1 hour 30 minutes. Assessment availability is twice a year: February and May from 2020 onwards. Sample assessment materials will be available to help centres prepare learners for assessment.

Assessment objectives

AO1 Demonstrate knowledge of facts, terms, processes and issues in relation to digital information technology

AO2 Apply an understanding of facts, terms, processes and issues in relation to digital information technology

AO3 Analyse, evaluate and make reasoned judgements about the use, factors and implications influencing digital information technology

AO4 Make connections with the concepts, issues, terms and processes in digital information technology

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Essential content

A Modern technologies

Learners should learn about how current and modern technologies are used by and have an impact on organisations and their stakeholders. Learners need to know the ways in which organisations and associated individuals use modern technologies to exchange information, communicate, and complete work-related tasks. Learners must be able to apply their knowledge to a range of vocational contexts.

A1 Modern technologies

Understand how and why modern technologies are used by organisations and stakeholders to access and manipulate data, and to provide access to systems and tools in order to complete tasks. Learners should understand the implications of these tools and technologies for organisations and stakeholders.

- Communication technologies:
  - setting up ad hoc networks (open Wi-Fi, tethering/personal hotspot)
  - security issues with open networks
  - performance issues with ad hoc networks
  - issues affecting network availability (rural vs city locations, developed vs developing countries, available infrastructure, mobile network coverage, blackspots).
- Features and uses of cloud storage:
  - setting and sharing of access rights
  - synchronisation of cloud and individual devices
  - availability (24/7)
  - scalability (getting more by renting/freeing to save money).
- Features and uses of cloud computing:
  - online applications
  - consistency of version between users (features, file types)
  - single shared instance of a file
  - collaboration tools/features.
- How the selection of platforms and services impacts on the use of cloud technologies:
  - number and complexity of features
  - paid for versus free
  - interface design (layout, accessibility, mobile vs desktop)
  - available devices.
- How cloud and 'traditional' systems are used together:
  - device synchronisation
  - online/offline working
  - notifications.
- Implications for organisations when choosing cloud technologies:
  - consideration of disaster recovery policies (service provider's, organisation's)
  - security of data (location, service provider's security procedures and features)
  - compatibility
  - maintenance (software updates, downtime, staff expertise)
  - getting a service/storage up and running quickly
  - performance considerations (responsiveness to user, complexity of task, available devices and communication technologies).

A2 Impact of modern technologies

Learners should understand how modern technologies impact on the way organisations perform tasks. Learners should understand how technologies are used to manage teams, to enable stakeholders to access tools and services, and to communicate effectively. Learners should understand the positive and negative impact that the use of modern technologies has on organisations and stakeholders.

- Changes to modern teams facilitated by modern technologies:
  - world teams (not bound by geographical restrictions, diversity)
  - multicultural
  - inclusivity (facilitation of member's needs)
  - 24/7/365 (no set work hours, team members in different time zones)
  - flexibility (remote working vs office based, permanent vs casual staff).
- How modern technologies can be used to manage modern teams:
  - collaboration tools
  - communication tools
  - scheduling and planning tools.
- How organisations use modern technologies to communicate with stakeholders:
  - communication platforms (website, social media, email, voice communication)
  - selection of appropriate communication channels (private/direct message, public status update) for sharing information, data and media.
- How modern technologies aid inclusivity and accessibility:
  - interface design (layout, font and colour selection)
  - accessibility features (screen reader support, alt text, adjustable typeface/font size, text to speech/'listen to this page')
  - flexibility of work hours and locations.
- Positive and negative impacts of modern technologies on organisations in terms of:
  - required infrastructure (communication technologies, devices, local and web-based platforms)
  - demand on infrastructure of chosen tools/platforms
  - availability of infrastructure
  - 24/7 access
  - security of distributed/disbursed data
  - collaboration
  - inclusivity (age, health, additional needs, multicultural)
  - accessibility (meeting legal obligations, provision requirements)
  - remote working.
- Positive and negative impacts of modern technologies on individuals:
  - flexibility (home/remote working)
  - working styles (choice of time, device, location)
  - impact on individual mental wellbeing (depression, loneliness, self-confidence, separation from stressful environment, feel in control of own schedule, schedule adjusted to meet needs of family, less time commuting).

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B Cyber security

Learners must understand how the increased reliance of organisations on digital systems to hold data and perform vital functions presents a range of challenges and dangers. They should understand the nature of threats to digital systems and ways that they can be mitigated through organisation policy, procedures and the actions of individuals. They should be able to apply knowledge of cyber security to a range of vocational contexts.

B1 Threats to data

Learners should understand why systems are attacked, the nature of attacks and how they occur, and the potential impact of breaches in security on the organisation and stakeholders.

- Why systems are attacked:
  - fun/challenge
  - industrial espionage
  - financial gain
  - personal attack
  - disruption
  - data/information theft.
- External threats (threats outside the organisation) to digital systems and data security:
  - unauthorised access/hacking (black hat)
  - malware (virus, worms, botnet, rootkit, Trojan, ransomware, spyware)
  - denial of service attacks
  - phishing (emails, texts, phone calls)
  - pharming
  - social engineering
  - shoulder surfing
  - 'man-in-the-middle' attacks.
- Internal threats (threats within the organisation) to digital systems and data security:
  - unintentional disclosure of data
  - intentional stealing or leaking of information
  - users overriding security controls
  - use of portable storage devices
  - downloads from internet
  - visiting untrustworthy websites.
- Impact of security breach:
  - data loss
  - damage to public image
  - financial loss
  - reduction in productivity
  - downtime
  - legal action.

B2 Prevention and management of threats to data

Learners should understand how different measures can be implemented to protect digital systems. They should understand the purpose of different systems and how their features and functionality protect digital systems. Learners should understand how one or more systems or procedures can be used to reduce the nature and/or impact of threats.

- User access restriction:
  - physical security measures (locks)
  - passwords
  - using correct settings and levels of permitted access
  - biometrics
  - two-factor authentication (who you are, what you know, what you have).
- Data level protection:
  - firewall (hardware and software)
  - software/interface design (obscuring data entry, autocomplete, 'stay logged in')
  - anti-virus software
  - device hardening
  - procedures for backing up and recovering data
  - encryption of stored data (individual files, drive)
  - encryption of transmitted data.
- Finding weaknesses and improving system security:
  - ethical hacking (white hat, grey hat)
  - penetration testing
  - analyse system data/behaviours to identify potential risks.

B3 Policy

Learners should understand the need for and nature of security policies in organisations. They should understand the content that constitutes a good security policy and how it is communicated to individuals in an organisation. To ensure that potential threats and the impact of security breaches are minimised, learners should understand how procedures in security policies are implemented in organisations.

- Defining responsibilities:
  - who is responsible for what
  - how to report concerns
  - reporting to staff/employees.
- Defining security parameters:
  - password policy
  - acceptable software/installation/usage policy
  - parameters for device hardening.
- Disaster recovery policy:
  - who is responsible for what
  - dos and don'ts for staff
  - defining the backup process (what is backed up, scheduling, media)
  - timeline for data recovery
  - location alternative provision (hardware, software, personnel).
- Actions to take after an attack:
  - investigate (establish severity and nature)
  - respond (inform/update stakeholders and appropriate authorities)
  - manage (containment, procedures appropriate to nature and severity)
  - recover (implement disaster recovery plan, remedial action)
  - analyse (update policy and procedures).

C The wider implications of digital systems

Learners should understand the wider implications of digital systems and their use. Learners should understand how legislation covering data protection, computer crimes and intellectual property has an impact on the way that organisations and individuals use digital systems and data. Learners should understand the procedures that organisations must follow in order to conform to legal requirements and professional guidelines.

C1 Responsible use

Learners should consider the responsible use of digital systems, including how systems and services share and exchange data as well as the environmental considerations of increased use.

- Shared data (location-based data, transactional data, cookies, data exchange between services):
  - benefits of using shared data
  - drawbacks of using shared data
  - responsible use (legal considerations, privacy, ethical use).
- Environmental:
  - impact of manufacturing, use, and disposal of it systems (energy, waste, rare materials)
  - considerations when upgrading or replacing digital systems
  - usage and settings policies (auto power off, power-saving settings, hard copy vs electronic distribution).

C2 Legal and ethical

Learners should understand the scope and purpose of legislation (valid at time of delivery) that governs the use of digital systems and data, and how it has an impact on the ways in which organisations use and implement digital systems. Learners should understand the wider ethical considerations of use of technologies, data and information, and organisations' responsibilities to ensure that they behave in an ethical manner.

- Importance of providing equal access to services and information:
  - benefits to organisations, individuals and society
  - legal requirements
  - professional guidelines/accepted standards.
- Net neutrality and how it impacts on organisations.
- The purpose and use of acceptable use policies:
  - scope – who the document applies to
  - assets – the equipment, documents, and knowledge covered by the policy
  - acceptable – behaviours that are expected/required by an organisation
  - unacceptable – behaviours that are not allowed by an organisation
  - monitoring – description of how behaviour is monitored by an organisation
  - sanctions – defining the processes and potential sanctions if unacceptable behaviour occurs
  - agreement – acknowledge (sign, click) that an individual agrees to abide by the policy.
- Blurring of social and business boundaries:
  - use of social media for business purposes
  - impact of personal use of digital systems (social media, web) on professional life.

- Data protection principles:
  - lawful processing
  - collected only for specific purpose
  - only needed information is collected
  - should be accurate
  - kept only as long as is necessary
  - data subject rights
  - protected
  - not transferred to countries with less protection.
- Data and the use of the internet:
  - the right to be forgotten
  - appropriate and legal use of cookies and other transactional data.
- Dealing with intellectual property:
  - the importance of intellectual property in organisations
  - methods of identifying/protecting intellectual property (trademarks, patents copyright)
  - legal and ethical use of intellectual property (permissions, licensing, attribution).
- The criminal use of computer systems:
  - unauthorised access
  - unauthorised modification of materials
  - creation of malware
  - intentional spreading of malware.

D Planning and communication in digital systems

Learners should understand how individuals in the digital sector plan solutions and communicate meaning and intention. They should understand how different forms of written and diagrammatical communication can be used to express understanding and demonstrate the flow of data and information.

D1 Forms of notation

Learners should be able to interpret and use standard conventions to combine diagrammatical and written information to express an understanding of concepts.

- Understand how organisations use different forms of notation to explain systems, data and information:
  - data flow diagrams
  - flowcharts
  - system diagrams
  - tables
  - written information.
- Be able to interpret information presented using different forms of notation in a range of contexts.
- Be able to present knowledge and understanding using different forms of notations:
  - data flow diagrams
  - information flow diagrams
  - flowcharts.

Grade descriptors

Level 1 Pass

Learners can recall, select and demonstrate a basic knowledge and understanding of facts, terms and issues. They can identify key points of simple processes.

Learners are able to apply limited knowledge and understanding of facts, terms, issues and processes to vocational contexts.

Learners make use of basic concepts to make simple descriptive statements about the use of digital systems. They can make partial connections between concepts to make judgements without justification.

Level 2 Pass

Learners can demonstrate a sound knowledge and understanding of facts, terms and issues. They can identify and describe processes.

Learners are able to apply and communicate their knowledge and understanding of facts, terms, issues and processes. They can solve problems in vocational contexts.

Learners relate their knowledge and understanding to vocational contexts, making some decisions on application and impact.

Learners make use of concepts to make valid evaluative statements about the use of digital systems in vocational contexts. They can make links between concepts to support judgements with some justification.

Level 2 Distinction

Learners can demonstrate a thorough knowledge and understanding of a broad range of facts, terms and issues. They can describe detailed and complex processes accurately.

Learners are able to effectively apply their knowledge and understanding of facts, terms, issues and processes. They can solve complex problems in vocational contexts.

Learners analyse vocational contexts by drawing on key concepts. They can make valid decisions on application of digital systems and can explain potential implications comprehensively.

Learners make use of concepts to make clear, insightful evaluative statements about the use of digital systems in vocational contexts. They can make effective use of links between concepts to support judgements and explore alternatives.

Key terms typically used in assessment

The following table shows the key words that will be used consistently by Pearson in our assessments to ensure learners are rewarded for demonstrating the necessary skills.

Please note: the list below will not necessarily be used in every paper and is provided for guidance only.

Command verbs	Definition
Annotate the diagram to explain how …	Label the diagram and provide an explanation for each identification.
Assess	Give careful consideration to all the factors or events that apply and identify which are the most important or relevant. Make a judgement on the importance of something, and come to a conclusion where needed.

Command verbs	Definition
Describe	To give an account of something, such as steps in a process or characteristics of something. The response should be developed as they are often linked, but do not need to include a justification or reason.
Discuss	Identify the issue/situation/problem/argument that is being assessed in the question. Explore all aspects of an issue/situation/problem/argument etc. by reasoning or argument.
Draw	Produce an annotated process either in the form of an information flow or data flow diagram
Evaluate	Review information then bring it together to form a conclusion, drawing on evidence, including strengths, weaknesses, alternative actions, relevant data or information. Come to a supported judgement of a subject's qualities and relation to its context.
Explain	An explanation that requires a justification/exemplification of a point. The answer must contain some element of reasoning/justification.
Give/State/Name	Require recall of one or more pieces of information.
Identify	Usually requires some key information to be selected from a given stimulus/resource.

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